

»»» Cameras (Terrestrial Observation)



Source: istock/MarioGuti

Image of smart phone camera showing potholes on a rural road

Relevance of this Tool Type within the Project Cycle



Definition

Cameras are manual or automatic optical instruments to capture static photos, omnidirectional (360°) photos, virtual reality (VR) photos, or videos. Cameras can be carried by humans (separately or as part of smartphones) or mounted on static spots (e.g., buildings, mountains), drones or satellites > [Fact Sheets Drones and Earth Observation via Satellites](#).

Step 1: Are Special Camera Features to be Considered?

- ✓ Most cameras and smartphones allow for storing and extracting **geographical information** along with the photos (highly recommended).
- ✓ Most allow for **streaming** captured photos/videos automatically to a server in a predefined **frequency** (useful for documenting progress on project sites with mounted cameras).
- ✓ Some allow for capturing **spherical** photos/videos (which can be used for creating a VR site visit). These photos require compatible players or head-mounted displays to be viewed.
- ✓ Some Mobile Data Collection (MDC) tools (> [Fact Sheet Mobile Data Collection \(MDC\)](#)) work by using the camera of the mobile device to directly link the captured images/videos with other collected information.

Manipulation:

Meta-data of images (such as location and time) can be manipulated and are not secure by default. Special software and hardware can be used to prevent fraud.

Quality:

The information purpose of images needs to be clear to depict the appropriate scene and angle. Pre-defined landmarks are helpful to analyze and locate the scene. Also, photo guidelines should be provided to avoid quality issues, for example blurred images > [Links to Further Sources](#).

Step 2: What Information Do I Need?

Cameras can capture, store, and transmit multiple media types that are collected in the field together with the required corresponding meta-data, such as GPS coordinates of the imaging position, recorded direction of the photo (bearing), and the precise time stamp of the imaging (date, hour, minute), which is necessary for the usage of photos for verification purposes. Cameras can be used for various purposes:

- Baseline documentation (project start)
- Documentation of project progress on (construction) sites
- Endline documentation at final inspection and ex-post evaluation

- Surveillance of project sites in remote or hard-to-reach locations (e.g., robust solar-powered cameras)
- Surveillance of project sites during nighttime (e.g., thermal or infrared)
- “Live on tape” (video) impressions of physical site visits (e.g., livestream of visit with head-mounted camera)
- VR site visit (indoor/outdoor)

Step 3: What Do I Need to Consider When Acquiring Cameras?

The following criteria should be considered when procuring cameras:

- ✓ Is professional hardware equipment required or will smartphones, apps, and digital cameras satisfy the needs?
- ✓ If I need to use highly specialized cameras (e.g., VR), do I need to purchase them, or will they be provided by service agencies capturing photos/videos?
- ✓ Is special software needed for viewing 360°/VR photos and videos or can they be presented on standardized platforms (e.g., HTML5)?
- ✓ Is an adequate power supply available to operate the camera for the intended duration? Or are battery-packs/solar-panels required? Who could operate them?
- ✓ Is a mobile network available to stream photos/videos to a server? Or can the camera be reached to export data from the device?

Interoperability Requirements

- ✓ Photos should be stored in widely used data formats to allow for easy access and exchange with partners and other systems (e.g., JPEG, PNG)
- ✓ Meta-data should be stored in Exif (Exchangeable Image File Format)
- ✓ Prior to capturing 360°/VR photos and videos, target platforms and formats to view the media should be determined
- ✓ If a building information modeling (BIM) or R/MIS software is used, the compatibility of media formats should be considered to allow for imports.

Legal Aspects

Human rights: In countries with human rights issues or in conflict settings, images/videos could be used against the population or vulnerable parts thereof, such as minorities.
> RMMV Guidebook Section 2.3.3.

Carefully choose the scene of the photo or film so as to avoid depicting individuals. Avoid photographic imaging or filming of **individuals**, especially if photos/videos are captured automatically in a predefined frequency
> RMMV Guidebook Section 2.3.1.

Familiarize yourself with **National Laws** that can restrict using cameras in certain areas, such as critical infrastructure (e.g., markets in conflict areas, police and military installations, dams, power stations, airports)
> RMMV Guidebook Section 2.3.5.

Data protection & Copyright: cameras have the potential to violate privacy. For example, image and video recordings can contain personal data if individual persons are identifiable in them. Hence, individuals should be depicted rather as “accessories” to a scene—for example, in a landscape photo—and should not be the main focus of the picture. You can find a list of **country-specific consent requirements for taking a photograph**

of identifiable people in the > [Links to Further Sources](#).

Contextualizing imagery in reference to geographic locations can make an individual in an image distinguishable. Filming or regularly photographing in sequences a person leaving a house and geo-tagging the pictures allows for the identification of a person by location. In those instances, local data protection or copyright law can apply. Avoid the inadvertent collection of personal data (such as pictures of faces). Only personal data strictly relevant should be collected and processed. If data minimization is not possible, data has to be anonymized, for example by blurring or pixelation > RMMV Guidebook Section 2.3.1.

If cameras allow, even inadvertently, the (constant) **surveillance of employees**, legal restrictions on the use of such tools may arise from applicable local laws. This might be the case where a project site is filmed or photographed in frequent sequences. Some privacy laws will give discretion to employers as to how far they can go with their employee monitoring programs. In other cases, employers will have to inform employees who are being monitored or even require employees to consent.

KfW requires proof of consent for any images or videos of individual persons to be published related to its projects, as per the regulations of the respective country. In case of copyright questions or issues > RMMV Guidebook Section 2.3.4. (Rights of Use).

If KfW (or persons acting on behalf of it) are (also) processing personal data, the privacy check in > RMMV Guidebook Section 2.3.1. must be followed.

Project Examples/Use Cases

- In the multi-country and multi-sectoral [Crisis Prevention Project in the Lake Chad Region \(TCD; PN: 42250\)](#) in West Africa, specific guidelines for pictures for reporting and verification of construction quality and progress were developed. These included certain quality standards, angles, and georeferencing.
- In the [E-Waste Project in Ghana \(E-WASTE; PN: 36594\)](#), permanently installed cameras are being used to continuously monitor operation of the electronic waste disposal.
- In the [Regional Infrastructure Fonds Khyber Pakhtunkhwa \(RIF-KP; PN: 30272\)](#) in Pakistan, pictures and videos of different stages of construction were uploaded into the R/MIS to monitor physical progress, completion of works, and use of funds.

Links to Further Sources

- Country-specific consent requirements for taking a photograph of identifiable people: https://commons.wikimedia.org/wiki/Commons:Country_specific_consent_requirements
- USAID example of a standard release agreement (to be translated and approved by the relevant mission/embassy): <https://www.usaid.gov/branding/photo-guide/release>
- 8 Ways to Make the Most of Construction Photos: <https://constructionblog.autodesk.com/construction-photos/>
- Comparison of 360° photo viewers <https://360photo-to-video.com/360-photo-viewers-comparison.html>
- Introduction to using Virtual and Augmented Reality https://www.dlr.de/sc/en/desktopdefault.aspx/tabid-1186/1640_read-19030/

»» Linkages to other tool types



Mobile Data
Collection Tools



Drones/UAV



Crowdsourcing
Tools



Earth Observation
via Satellites



(Remote) Management
Information Systems



eLearning Tools



Building Information
Modeling



Collaboration Tools

Further information on how to use this tool type in an RMMV context can be found here:

